

History of 19th & 20th Century Physical Sciences STSC201

Spring 2012
MW 2-3:30
McNeil 103

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Office Hours: Wednesdays 3:30-4:30 and by appointment

Over the last two centuries, scientists have produced a broad range of knowledge about the physical world, from light to electromagnetism to atoms to nuclei, facilitating or explaining an ever increasing mastery over the natural world. Because of their success, these developments played an important role in forming our views of how to effectively generate knowledge of the natural world.

This course will examine some of the major developments in the physical sciences during the 19th and 20th century, asking how that knowledge and the means by which it was produced related to institutions, technical practices and broader cultural contexts of the time. We will also look for continuities and discontinuities in knowledge and knowledge production to explore how past practices have, or have not, left their traces in later science.

Textbooks are available at the Penn Book Center and in Rosengarten Reserve:

Hunt, Bruce J. (2010) *Pursuing Power and Light: Technology and Physics from James Watt to Albert Einstein*

Kragh, Helge (1999) *Quantum Generations: A History of Physics in the Twentieth Century*

McCormmach, Russel (1991) *Night Thoughts of a Classical Physicist*

Morus, Iwan Rhys (2005) *When Physics Became King*

Course work will consist of: class participation; three short take-home essay questions to which your responses should be based on the lectures and assigned readings; and one 10-15 page term paper on a topic of your choosing. Your final grade for the course will be calculated as follows:

class participation:	15%
each of three essays:	15%
term paper:	40%

An essay turned in late without pre-arranged permission or a documented excuse will be penalized a full letter grade for each day it is late.

Reading and Writing Assignments:

Wednesday 1/11	Introduction
Monday 1/16	MLK Day
Wednesday 1/18	Morus chp. 1 <i>Queen of the Sciences</i>
Monday 1/23	Morus chp. 2 <i>A Revolutionary Science</i>
Wednesday 1/25	Hunt chp. 1 <i>Steam and Work</i>
Monday 1/30	Hunt chp. 4 <i>Electricity: Currents and Networks</i>
Wednesday 2/1	Morus chp. 3 <i>The Romance of Nature</i>
Monday 2/6	Morus chp. 4 <i>The Science of Showmanship</i>
Wednesday 2/8	Morus chp. 6 <i>Mysterious Fluids and Forces</i> 1st essay assigned
Monday 2/13	Hunt chp. 5 <i>Electromagnetism: Ether and Field</i> 1st essay due
Wednesday 2/15	Morus chp. 5 <i>The Science of Work</i>
Monday 2/20	Hunt chp. 2 <i>Energy & Entropy</i> Hunt chp. 3 <i>Kinetic Theory</i>
Wednesday 2/22	Morus chp. 8 <i>Places of Precision</i>
Monday 2/27	Hunt chp. 6 <i>Electric Power and Light</i>
Wednesday 2/29	Morus chp. 9 <i>Imperial Physics</i> Hunt chp. 7 <i>Into a New Century</i>
Monday 3/5	Spring Break
Wednesday 3/7	Spring Break
Monday 3/12	McCormmach pp. 1-91
Wednesday 3/14	McCormmach pp. 92-160 2nd essay assigned
Monday 3/19	Kragh chp. 7 <i>Einstein's Relativity, and Others'</i> Kragh chp. 8 <i>A Revolution that Failed</i> 2nd essay due

- Wednesday 3/21 Kragh chp. 3 *Discharges in Gases and What Followed*
Kragh chp. 4 *Atomic Architecture*
- Monday 3/26 Kragh chp. 5 *The Slow Rise of Quantum Theory*
Kragh chp. 11 *Quantum Jumps*
- Wednesday 3/28 Science in East Asia (Readings TBA)
- Monday 4/2 Kragh chp. 9 *Physics in Industry and War*
Kragh chp. 10 *Science and Politics in the Weimar Republic*
- Wednesday 4/4 Kragh chp. 16 *Physics and Dictatorships*
Kragh chp. 18 *From Uranium Puzzle to Hiroshima*
- Monday 4/9 Kragh chp. 17 *Brain Drain and Brain Gain*
Kragh chp. 20 *Militarization and Megatrends*
- Wednesday 4/11 Kragh chp. 21 *Particle Discoveries*
Kragh chp. 22 *Fundamental Theories*
3rd essay assigned
- Monday 4/16 Kragh chp. 24 *Solid State Physics*
Kragh chp. 25 *Engineering Physics and Quantum Electronics*
3rd essay due
- Wednesday 4/18 Kragh chp. 26 *Science under Attack – Physics in Crisis?*
- Monday 4/23 Conclusions
Term paper due